

REMARKS

Claims 1, 3-28 are pending and presented for examination in this application. Claims 14, 17-27 are allowed in the office action (paragraph 10, page 8). Claims 15 and 16 are indicated in the office action (page 9) to be allowable if rewritten in independent form.

As to the above amendment to Claim 1, see Claim 2. Claim 1 having been thus amended, Claim 2 is canceled. Above Claim 15 has been rewritten in independent form.

Specification, Drawings

At page 2, paragraph 1 of the Office Action, an objection to Figure 20 and the specification has been made with regard to items 4, 11 and 12 of Fig. 20 being said to go unmentioned in the description. At page 10 of the Office Action, the Examiner acknowledges the proposed revision regarding removal of the reference signs 11 and 12 from Fig. 20 but the Examiner states (page 10 of the office action) that reference sign '4' was not addressed.

Upon reviewing the application and drawing, it does not appear that revision to reference numeral '4' is required. The numeral '4' denotes output light from a surface of the multi-layer structure 1. Conversely, the numeral '5' denotes output light from a surface of the substrate 3. Figure 20 shows output light from the multilayer structure; therefore, the numeral '4' is appropriate.

In view of the above, reference signs 11 and 12 are to be removed from Fig. 20; the drawing itself is to remain the same. The Examiner is asked to confirm agreement with the proposed approach, and the revised Fig. 20 will then be submitted.

Double Patenting

At page 3, paragraph 3 of the Office Action, Claims 1, 3, 6, 7, 9 and 10 have been rejected under the (judicially created) doctrine of obviousness-type double patenting, based on claims 1, 5, 7, 8, 11 and 16 of U.S. Patent Application to Kittaka et al. Through telephone communications with the Examiner, it has been ascertained that the Examiner refers to US

2003/0174402.

Applicants respond as follows. According to the PAIR system on June 1, 2005, the status of US 2003/0174402 is that a non-final office action is pending. No patent has issued in US 2003/0174402. Thus, no response by Applicants is needed at this time with regard to the obviousness-type double patenting rejection.

Anticipation Rejection

At page 4, paragraph 5 of the Office Action, claims 1, 3, 4 and 6-11 have been rejected under 35 U.S.C. 102(b) as being anticipated by Burt et al. (USP 6,052,213).

The rejection is believed to be obviated, in that claim 1 now recites the subject matter of claim 2. Wherefore, reconsideration and withdrawal of the anticipation rejection are respectfully requested.

Obviousness Rejections

At page 5, paragraph 7 of the Office Action, claims 1, 3 and 5-9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. in view of Todor et al. At page 8, paragraph 9, claim 2 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. combined with Todor.

The Examiner recognizes that Inoue does not explicitly state that the periodic multilayer structure is a one-dimensional photonic crystal, but the Examiner's position is that Inoue's structure is a one dimensional photonic crystal, because the uniaxial periodic multilayer structure modulates input wavelength light and produces second order harmonic effects indicative of having a photonic band structure. (Office action, page 5.) The Examiner also recognizes that Inoue is silent concerning the period-to-wavelength recitation of claim 2 (Office action, page 8). However, the Examiner's position, citing Todor (col. 6, lines 35-50), is that it would have been obvious for the photonic crystal device of Inoue to have a period greater than or equal to one half the wavelength divided by the refractive index in order to have proper signal transmission in optical communications. (Offic action, page 8.)

Applicants respectfully traverse this obviousness rejection.

In Inoue (the primary reference), the multi-layer films 41 to be laminated are formed of a material having non-linear optical coefficient. Further, the input light is modulated.

On the other hand, it is not necessary that the multi-layer film of the claimed invention has non-linear optical coefficient. The function of the claimed device is to separate the light based on the frequency of the input light.

Also, Applicants' claim 1 now recites " $\lambda/2n_M < a$ in which n_M is an average refractive index in the one-period range of said multilayer structure in the wavelength λ ". Todori does not teach such an expression. Todori fails to account for n_M . Todori teaches that "the period of two different materials having different refractive indices (i.e., the thickness of a pair of two different materials) is preferably equal to or smaller than $10\text{ }\mu\text{m}$,¹ and is preferably determined in consideration of the wavelength of light used. For example, in consideration of a wavelength of $1.55\text{ }\mu\text{m}$ for optical communications, the period interval is set at nearly half this wavelength." (Todori, col. 6, lines 25-44.) Todori states that "setting the wavelength of light corresponding to the photonic band edge in the vicinity of the wavelength of the light to be transmitted means that the wavelength of the light to be transmitted falls within the range of at least $\pm 15\%$ with respect to the wavelength of the photonic band edge." (Todori, col. 6, lines 44-49.)

Todori fails to teach being on a particular side (greater or less than) a benchmark, while Applicants' claim 1 now recites that the period must be greater than $\lambda/2n_M$. Also, Todori fails to teach using $\lambda/2n_M$ as controlling expression. Todori does not account for n_M , either at column 6 or in his Examples or elsewhere. The Examiner has attributed too much to Todori, which fails to teach what Applicants' claim 1 now recites.

Thus, even with Inoue and Todori, clearly a person of ordinary skill in Applicants' art at the time of the invention still fails to arrive at the presently claimed invention. Reconsideration

¹This disclosure in Todori is not any more than what is outlined in the Background of the present application, pointing out that "the change Δx of the position of each of the beam spots on the beam-receiving surface generally needs to be not smaller than several tens μm because each of the beam-receiving means has a predetermined size." (Applicants' specification, Background, page 4, lines 15-18.)

and withdrawal of the obviousness rejections based on Inoue combined with Todor are respectfully requested.

At page 6, paragraph 8 of the Office Action, claims 1, 3, 5, 6, 9-13, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Normandin in view of Todor et al. The Examiner recognizes that Normandin does not explicitly state that the periodic multilayer structure is a one-dimensional photonic crystal. However, the Examiner's position is that Normandin's structure was a one dimensional photonic crystal. (Office action, pages 6-7.)

As has already been explained above regarding Todor, Todor fails to teach or suggest the claimed expression " $\lambda / 2n_M < a$ in which n_M is an average refractive index in the one-period range of said multilayer structure in the wavelength λ ". Todor does not disclose the relevant expression, $\lambda / 2n_M$. Moreover, Todor further fails to disclose that " a " must be greater than such an expression. Todor fails to teach importance of n_M . Thus, even with Normandin and Todor, clearly a person of ordinary skill in Applicants' art still is far from Applicants' claimed invention of claim 1, and thus Applicants' claims are non-obvious over Normandin and Todor.² Reconsideration and withdrawal of the obviousness rejection based on Normandin combined with Todor are respectfully requested.

In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 1, 3-28 be allowed, and that the application be passed to issue.

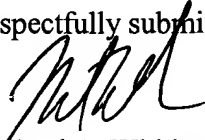
Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephone or personal interview.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition

²Without commenting on each dependent claim, Applicants also point out that neither Normandin nor Todor teach or disclose that "the photonic crystal comprises respective layers continuously changing in terms of refractive index, and a refractive index difference is kept between the respective layers" as recited in Applicants' claim 28 (emphasis added).

and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,



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